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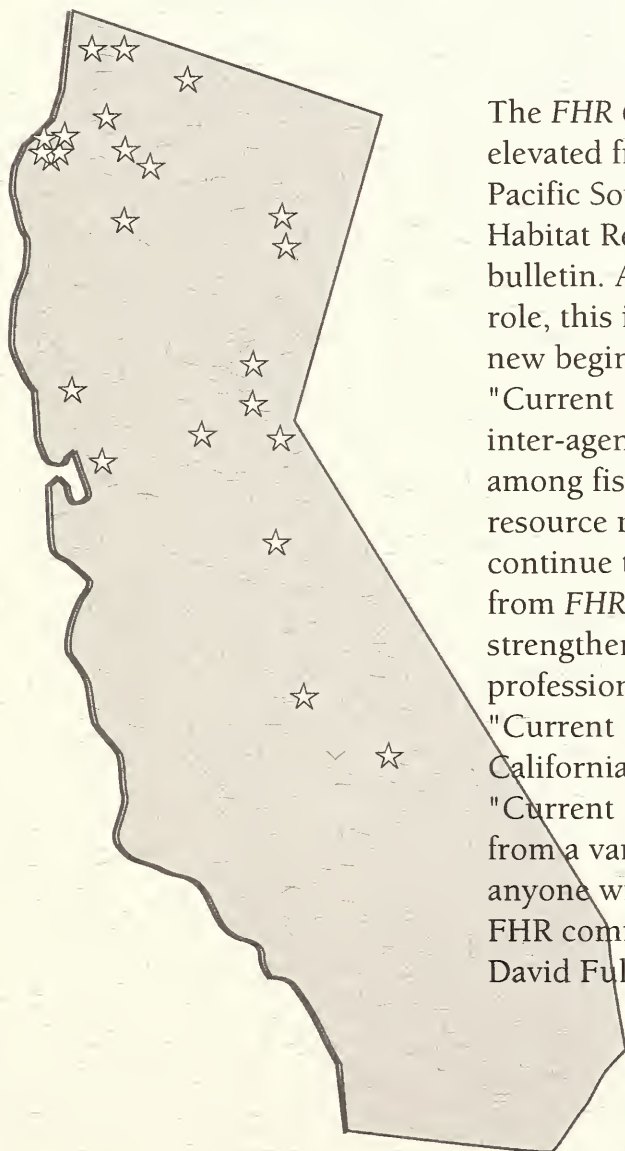
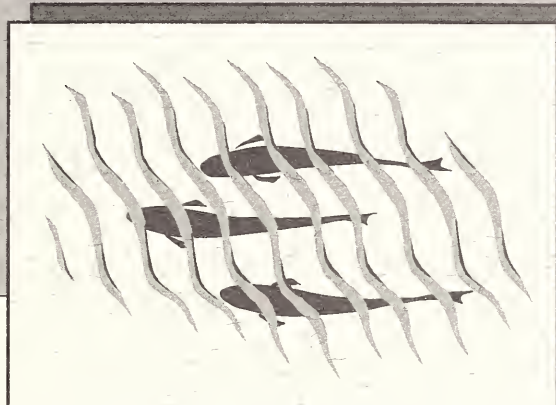
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# FHR **Current Currents...**

Region 5 Fish Habitat Relationships Information Bulletin  
Summer 1993

*Enoch*



The *FHR Currents* publication series has been elevated from the technical bulletin for the Pacific Southwest Region to the national Fish Habitat Relationships program technical bulletin. As *FHR Currents* moves into its new role, this issue of "Current Currents" marks a new beginning as well. The objective of "Current Currents" remains the same: to foster inter-agency and intra-agency communication among fishery biologists, aquatic scientists and resource managers in California. We will continue to publish "Current Currents" apart from *FHR Currents* on an annual basis to help in strengthening the network among these professionals in California. Distribution of "Current Currents" will be limited to our California audience. This is our third and largest "Current Currents," with updates submitted from a variety of agencies. We encourage anyone with a study or report of interest to the FHR community to contact Jerry Boberg or David Fuller at (707) 442-1721.



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## ***California Department of Fish & Game***

Contact: Forrest Reynolds  
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### **Salmon, Steelhead and Anadromous Fisheries Program**

We continue to make progress toward restoration of salmon and steelhead resources in California, although budgetary difficulties brought on by the state deficit also continue.

On the North Coast, much of our emphasis is on restoration of spawning and rearing habitat. A great deal of work remains to be done to correct the damage to habitat that has resulted from past and, in many cases, continuing land-use practices. With the inception of funding from sales of the Steelhead Report and Restoration Card, we anticipate that steelhead restoration activities will get a needed boost. Prior to establishment of this fund, no dedicated monies were available for steelhead restoration.

In the Central Valley, availability of water for spawning and rearing, as well as entrainment of salmon and steelhead into water diversions, are still the highest-priority problems. We are hopeful that enactment of the federal Central Valley Project Improvement Act will hasten fishery restoration in the Sacramento-San Joaquin system and the Delta. The act provides part of the funding for correction of some of the more severe problems affecting anadromous fish in the Central

Valley, including installation of a device to allow release of cool water from the depths of Lake Shasta into the Sacramento River during the critical periods of spawning and egg incubation.

In the San Joaquin River system, we have entered into agreements with the Department of Water Resources for identification and implementation of habitat restoration projects. We are evaluating the potential for one or more small restoration hatcheries in this system, rather than a large facility. This is in keeping with our mandate to emphasize restoration of natural production of anadromous fish throughout the state.

On the central and south coast, cooperative rearing and education have been highlighted. The Commercial Salmon Trollers Advisory Committee recommended funding from the Commercial Salmon Stamp Account for continuing and expanding the rearing and educational program sponsored by the nonprofit Central Coast Salmon Enhancement group. The committee also recommended funding assistance to the Monterey Salmon and Trout Project for coho rearing, chinook saltwater pen rearing at Moss Landing, and for their popular and effective educational program.

We continue to be hopeful that our constituents will be successful in working with their elected representatives toward providing additional funding for the grants program, our public involvement component of fishery restoration in California.

**Cooperative Extension/Sea Grant  
Marine Advisory Programs  
University of CA/Oregon State University**

Contact: Jim Waldvogel  
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**Smith River Chinook Study**

A chinook salmon spawning escapement study was started on the Smith River, California, in 1980. This long-term study is determining the relative abundance of spawning fall chinook salmon on a defined section (1.7 miles) of the West Branch Mill Creek. A lack of any historic long-term spawning escapement estimates for the Smith River prompted the study.

Table 1 expresses the results of the survey since 1980. The monitoring of this chinook population may reflect some present habitat changes in the system. However, a six year drought cycle, poor ocean conditions and changing ocean fisheries have also affected the chinook adult returns.

The development of the Smith River as a National Recreation Area has increased the need for better fishery management of the system. Long-term fishery data can improve the management decisions that need to be made wisely.

Year	# Chinook Observed	% Hatchery Steelhead	# Coho Salmon	# Chum Salmon
1980	128	0.0%	11	0
1981	107	16.5%	2	0
1982	155	18.2%	4	0
1983	110	21.4%	3	0
1984	111	36.5%	6	4
1985	185	2.5%	28	2
1986	180	4.1%	11	8
1987	153	0.0%	27	1
1988	249	3.5%	5	5
1989	57	3.7%	13	0
1990	31	0.0%	2	0
1991	93	0.0%	7	0
1992	144	0.0%	6	0

Table 1. Results from chinook salmon spawning escapement study conducted on the Smith River, California since 1980.



## Winchuck River Steelhead Study

The Winchuck River is a small coastal river located on the California/Oregon border. The mainstem Winchuck River flows through Oregon, and the South Fork of the Winchuck flows through California. This pristine coastal river has excellent rearing and spawning habitat, with healthy populations of chinook salmon, steelhead trout and cutthroat trout.

The Oregon Department of Fish and Wildlife manages this river as a "wild fish" system. Extensive logging has occurred over the years in several tributaries, and the US Forest Service has accomplished numerous stream enhancement structure projects.

In 1985, a program to sample adult steelhead caught in the Winchuck River sport fishery began.

Scale samples, length, weight, and sex were taken from steelhead caught. The Oregon Department of Fish and Wildlife analyzed the scale samples for age, origin of fish (wild or hatchery), repeat spawning and fresh water residency. Table 2 provides the results of adult steelhead samples from 1985 to 1992.

Results from the sport fishery sampling program have revealed that a large number of hatchery steelhead stray into the Winchuck River. The direct effects of these hatchery stocks spawning with wild fish is not known. The freshwater residency of the juvenile steelhead (two, three and four years) exhibits the need for small coastal rivers to have excellent rearing habitat and water quality. One adult female steelhead (wild fish) caught in 1992 had repeat spawned four times and was a three-year fresh water resident seven years old!

Year	# Adult Steelhead Sampled	% Hatchery Steelhead	% Repeat Spawners	Age at Smoltification (Wild Fish Only) - %		
				2 Year	3 Year	4 Year
1985	17	35%	12%	N/A	N/A	-
1986	45	42%	18%	70%	30%	-
1987	120	30%	47%	67%	33%	-
1988	127	33%	24%	81%	19%	-
1989	40	45%	18%	64%	36%	-
1990	41	24%	12%	58%	42%	-
1991	33	18%	9%	55%	41%	4%
1992	43	23%	28%	63%	37%	-

Table 2. Results of a program to sample adult steelhead in the Winchuck River from 1985 to 1992.



## **National Oceanic & Atmospheric Administration**

Contact: Chris Mobley  
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### **National Marine Fisheries Service Southwest Region**

The Santa Rosa Northern Area Office of the National Marine Fisheries Service's (NMFS) Southwest Region is responsible for marine, estuarine, and anadromous fisheries management in Northern California, from Monterey to Crescent City.

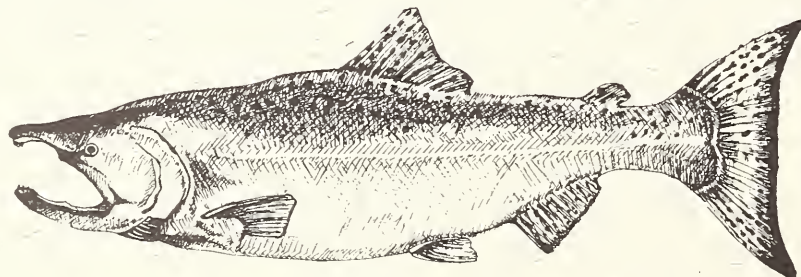
The Habitat Conservation Division includes two fishery biologists, a water-policy coordinator, a fish passage engineer, and an area supervisor. The Habitat Conservation Division reviews Environmental Impact Statements/Reports, US Army Corps of Engineers Public Notices, and other environmental documents pursuant to the Fish and Wildlife Coordination Act, the National Environmental Policy Act, the Marine Protection, Research, and Sanctuaries Act, and other laws.

The Protected Species Division, which includes two fishery biologists in the Santa Rosa office, is

responsible for administration of the Endangered Species Act for the Sacramento River winter-run chinook salmon. The winter-run chinook salmon spawning runs have declined from over 100,000 fish in late 1960, to a few hundred fish in the last few years.

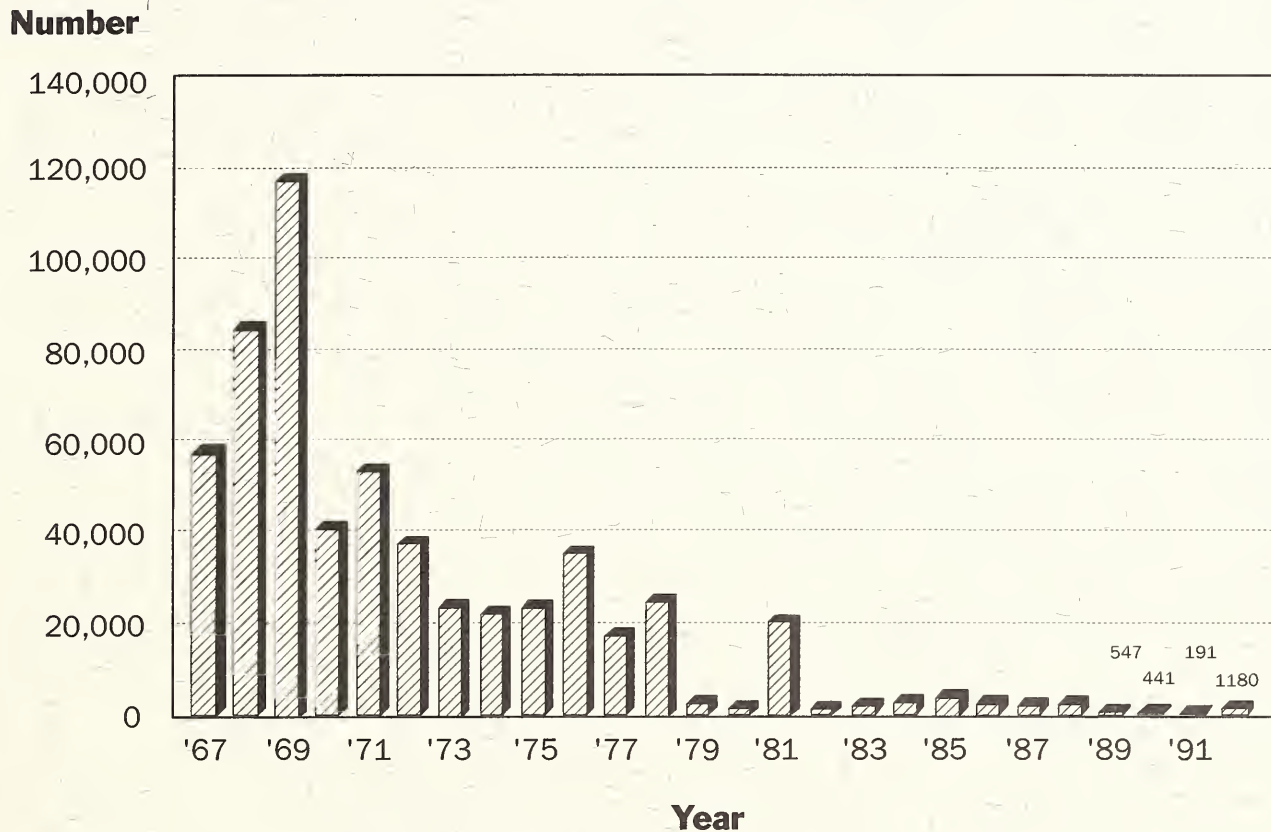
While NMFS reviews projects on all of Northern California's rivers, most of our time is spent on the Sacramento River. The listing of the winter-run chinook salmon under the Endangered Species Act requires consultations for all federal projects, permits for non-federal projects that affect the winter-run chinook salmon, and the development of a recovery plan for the winter-run chinook salmon. Passage of the Central Valley Project Improvement Act (H.R. 429) and the recent failure of the State Water Resources Control Board to pass water quality standards for the San Francisco Bay and Delta have increased the need to develop new management approaches to the Sacramento River.

The Sacramento River spring-run chinook salmon population is also at a historic low. It has been listed as a species of special concern by the California Department of Fish and Game. There





## Adult Winter-Run Chinook Salmon Migrating past Red Bluff Diversion Dam



has been a downward trend in the runs from an average of about 2,000 fish in the 1940s to a few hundred fish annually in the 1980s for Mill and Deer creeks, the best spring-run tributaries on the Sacramento River. In an effort to avoid a listing of the spring-run chinook, NMFS is working with an ad-hoc committee of agency staff, farmers, fishermen, and environmental advocates to develop an immediate action plan to solve habitat problems in Mill and Deer creeks as well as other spring-run tributaries of the Sacramento River.

NMFS is reviewing a petition to list the coho salmon in Scott and Waddell creeks as a threatened species from the Santa Cruz county Fish and Game Advisory Commission. These creeks may have the only remaining coho south of San Francisco. The petition claims that central coast coho should be considered a genetically isolated stock of Pacific salmon because they are reproductively isolated from coho north of San Francisco Bay.

## **North Coast Regional Water Quality Control Board**

Contact: Christopher M. Knopp  
(707) 442-1721

### **Testing Indices for Measuring the Condition of Cold Water Fish Habitat Project Summary**

Beginning in January 1992, the North Coast Regional Water Quality Control Board and the California Department of Forestry began a project to develop a method to determine the relative quality of fish habitat. The motivation was the need to evaluate the impacts of Forest Practice Rules on instream beneficial uses (cumulative and direct effects); and concurrently, the efficacy of the rules as a means to maintain these uses.

Experts throughout the western United States were consulted over a five month period. The result was a detailed monitoring plan focused on measuring structural aspects of aquatic ecosystems. Parameters were selected based on the best available research as to what parameters were most likely to reflect differences associated with forest management, the amount of time and cost required to take the measurements, and the measurement's applicability as a future regulatory tool.

Sampling was limited, by geology and stream types, to a coastal strip approximately 200 miles long by 20 miles wide, extending 60 miles north of San Francisco to the Oregon border in northwestern California. Sixty, 1,000-meter long reaches were measured for four primary variables: VStar (the amount of fine sediments accumulated in pools), RASI (Riffle Armour Stability Index, which measures the composition of riffle

sediments), Pool Frequency (intended to measure number, length and depths of all pools in the reaches), and Woody Debris (which included measures of volume, cover, associated pool volumes and associated changes in substrate).

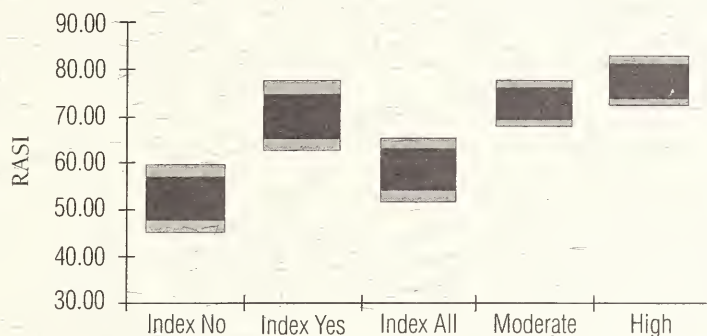
Watershed condition was determined in two ways. First, three subjective categories were established which reflected Index conditions (the least disturbed watersheds available), Moderately disturbed conditions (which reflected current Forest Practice Rules), and Highly disturbed conditions. Drainages in the Moderate and High categories were randomly selected from a pool of Timber Harvest Plan records. All Index reaches available were sampled. Sampling occurred without regard to ownership.

Second, watershed condition was determined with a new sediment budgeting procedure which utilized a laptop computer running a customized CAD program. This procedure enabled us to directly digitize air photo and map information to yield a gross (due to limited time) but useful estimate of sediment yields. All 60 reaches were analyzed for three separate periods (1960, 1970 and 1980). The data collection (from the air photos) was completed by one person in approximately 45 days, including travel time.

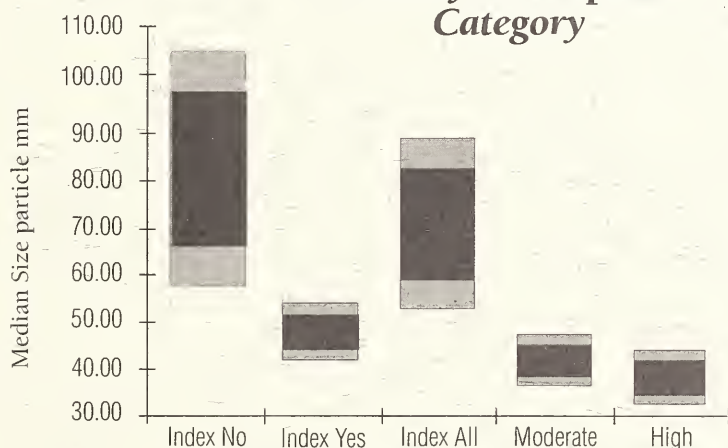
Direct interrogation of the CAD files currently allows quantification of harvest unit areas, road lengths, landslides and stream crossings for 180 maps in approximately one hour. Much greater resolution in sediment estimates are possible with the current technique at the cost of additional time.



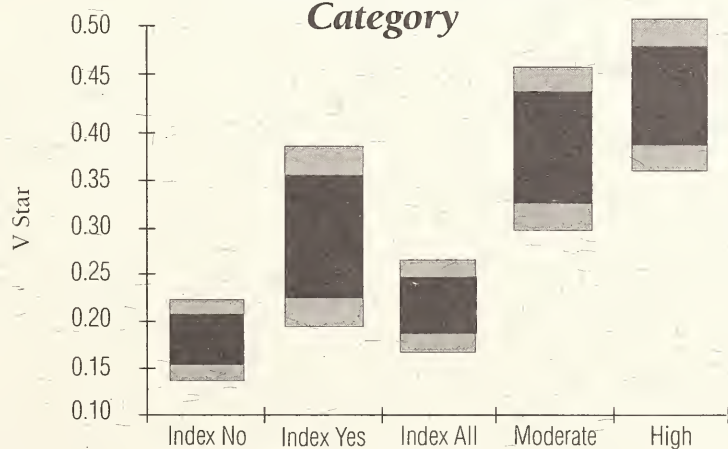
**RASI by Descriptive Category**



**D50 by Descriptive Category**



**V Star by Descriptive Category**



These three graphs display 80 and 95% confidence bands around the category means. "Index No" represents reaches with little previous management. "Index Yes" represents reaches with historic management only. "Index All" is a combination of "Index No" and "Index Yes". "Moderate" represents current practices against a "historic" background. "High" represents extensive upslope disturbance and inconsistent application of forest practices. Sample sizes were: "Index No" = 12; "Index Yes" = 6; "Index All" = 18; "moderate" = 21; and "High" = 21.

The "Index No" and "Index All" categories are significantly different from the "High" category at an alpha of 0.05. Also, the "Index Yes" category is significantly different from the "Index No" category.

These data show three aspects of fish habitat condition that are quantifiable. The data also show a continuing instream impact from historic forest management that is statistically indistinguishable from current upslope disturbance.

These results may be used to identify Sensitive Watersheds, evaluate the aggregate effectiveness of forest practices, evaluate watershed health or cumulative effects or may form the basis for setting restoration priorities.



Results of the project indicate that there are statistically significant differences in fish habitat condition related to upslope management. A surprising result was that watersheds logged without regard to protecting aquatic ecosystems 60 to 100 years ago show very little recovery of pool fines or substrate composition compared to habitat in unmanaged streams. VStar, RASI and

Cover associated with woody debris offer a means to identify which category additional reaches belong to, and hence, a means to categorize the condition of a reach. Future plans are being developed to expand this approach to other geologies, with parameters that reflect the characteristics specific to that area. The final report is expected to be released in July, 1993.

# ***Redwood National Park***

Contact: David Anderson  
(707) 488-2911

The Fish and Wildlife Branch of Research and Resources Management Division at Redwood National Park is involved in several long term fisheries studies and monitoring projects.

Redd and carcass winter stream surveys of index streams continue. The information is used to determine run trends and evaluate management activities. With the closing of the Prairie Creek Hatchery, spawning information will be used to monitor run changes. Pre- and post-dam removal monitoring of fish distribution from several years of spawning surveys, cross sectional surveys, residual pool depths, and pebble counts were used to evaluate the removal of the Lost Man Creek dam. Results show no change in residual pool depths and an increase in the percentage of fish spawning above the former dam site. The reaches above and below the site were habitat typed before and after the dam removal. Because of the inherent problems of the technique and no data on the

stream's natural variation, we were unable to detect significant changes due to the dam removal.

Summer and winter monitoring of US Highway 101 Bypass streams is used to determine the effects of the highway construction on streams in the Prairie Creek and Klamath River watersheds. The field work for the 10 year summer bypass monitoring project is now complete and data is being analyzed and summarized. Monitoring included cross section and longitudinal surveys, freeze-core gravel sampling, stream mapping of physical features and surface gravel quality, benthic invertebrate sampling, and photo documentation. Winter monitoring continued with the placement of fertilized coho eggs into artificial redds to determine the effects of recently introduced fine sediment from highway construction. Percent fine sediment, dissolved oxygen concentrations, apparent velocity and egg-to-hatching survival were measured in the redds.

The Redwood Creek estuary monitoring project, ongoing since 1980, determines yearly numbers and growth of juvenile chinook salmon and

steelhead trout utilizing the estuary in summer and fall. Estuarine water quality and water elevations are also monitored. Solutions, alternatives, and funds are being sought for estuary restoration. Summer steelhead snorkel surveys of Redwood Creek during the summer, conducted since 1981 are also continuing. The numbers of adult fish observed in the 25.9 km index reach have declined. One of five parks participating in the National Park Service Western

Region study, Redwood National Park is cooperating in an amphibian survey of the park and surrounding area.

Stream restoration is ongoing (e.g. instream structures) in addition to the watershed rehabilitation program that removes old logging roads and stream crossings to reduce the sediment input into streams.



## ***US Fish & Wildlife Service Coastal California***

Contact: Joe Polos  
(707) 822-7201

### **Fishery Resource Office**

During 1993, the Coastal California Fishery Resource Office (CCFRO) will continue a variety of salmonid monitoring projects within the Klamath River basin.

In 1991, a long-term monitoring project on Wooley Creek (a tributary to the Salmon River) was initiated. The purpose of the project was to monitor the population trends of juvenile salmonids, primarily steelhead, and to monitor changes in the aquatic habitat. During 1991 field activities, the majority of the creek was habitat typed, and in 1992 four index sites were established and the numbers of juvenile salmonids utilizing specific habitat types within the index sites were determined during snorkel surveys. "Redi-mapping" of the index sites was initiated in 1992 and will continue, along with the juvenile

count surveys, in 1993. Temperature data is being collected at four sites within the creek with Ryan Tempmentors.

Monitoring of salmonid population trends in New River (a tributary to the Trinity River) continues by utilizing a rotary screw trap to monitor the juvenile salmonid emigration during the spring and snorkel surveys of index sites during the summer to determine habitat specific juvenile salmonid densities. Snorkel surveys for spring chinook and summer steelhead adults are also conducted throughout the river during the summer and fall. During the winter of 1992, a resistance board weir was installed on New River to collect information on winter steelhead. This type of weir is designed to withstand moderate to high flows that typically wash out A-frame weirs. The weir worked well until the major rain event on January 20 during which the weir sustained major damage. During the summer of 1993 the weir will be repaired and tested again next winter.



Monitoring of juvenile salmonid emigration on the mainstem Klamath and Trinity Rivers will continue during 1993 with the operation of rotary screw traps near Orleans on the Klamath River and near Willow Creek on the Trinity River. This is an ongoing program which is intended to produce juvenile salmonid abundance information that in the future can be related to adult returns and to the habitat conditions that the juveniles were exposed to. Additional information collected includes the migration timing of natural and hatchery salmonids, sizes and condition of migrants and the relative contribution of natural and hatchery production. Since 1991, in cooperation with the USFWS CA/NV Fish Health Center, a salmonid disease survey has been conducted to assess the health of juvenile salmonids. The data collected at the Willow Creek sites is currently being used by the USFWS National Ecology Research Center in their development of a model that will demonstrate the

relationship between habitat and juvenile salmonid production.

CCFRO, in cooperation with Yosemite National Park (YNP), has been involved in habitat restoration efforts on the Merced River within Yosemite Valley since 1991. YNP restoration efforts have included removing rip-rap along stream banks, riparian re-vegetation, fencing and closure of areas impacted by pedestrian traffic, and allowing fallen trees to remain in the stream. CCFRO has habitat typed and snorkel surveyed the Merced River through the valley. "Redi-mapping" and snorkel surveys of protected areas have been conducted to monitor habitat improvement and fish community structure.

If you have any questions regarding these programs contact: Joe Polos (mainstem juvenile monitoring), Tom Shaw (Wooley Creek and Yosemite) or Matt Longenbaugh (New River) at (707) 822-7201.



## ***USDA Forest Service***

### **Pacific Southwest Region Fish Habitat Relationships Program**

#### **Contacts:**

Jerry Boberg/Dave Fuller (707) 442-1721  
Jeff Reiner/Julie Perrochet (916) 573-2624

The Pacific Southwest Region Fish Habitat Relationships Program is now operating under a program document recently approved by Regional Forester Ron Stewart. This document outlines the

Program's objectives, processes and outputs, in addition to providing a protocol for awarding grant monies. The FHR Program awarded \$200,000 in grants to fund 11 administrative studies on National Forest lands throughout California in FY93.

The *FHR Currents* publication series has been changed from being the technical bulletin for the Pacific Southwest Region to being the national FHR technical bulletin. With these changes, *FHR Currents* will publish papers from authors throughout the nation.



The regional FHR Program has been coordinating with other Forest Service regions through the National FHR Program and is attacking some of the problems facing Forest Service fishery biologists. This year, a group of committees are working on: Instream Flow Issues, Cumulative Watershed Effects Process, Aquatic Ecosystems in Ecosystem Management, and Tools for Translating Fisheries Data for Line Officers.

### **Klamath National Forest**

Contact: Ken Baldwin  
(916) 493-2243 (R05F05D52A)

During the summer of 1992 we measured and monumented (where physical markers have been placed) 20 topographic cross-sections across Indian Creek, a tributary of the Klamath River near Happy Camp, California. These profiles are intended to be re-measured in subsequent years for the purpose of detecting changes in coarse sediment storage in the stream channel. Coarse sediment production and movement in the channel strongly influences the quality of riparian habitat.

The project is patterned after work done by Tom Lisle (USFS Experiment Station, Arcata, CA). Lisle used cross-sections measured yearly for the purpose of calibrating US Geological Survey stream discharge gauges. Changes in the profiles from year to year depicted the movement of sediment from the 1964 flood through the channel.

Our project monitors a variety of channel forms for a broader picture of coarse sediment movement. The profiles were monumented with brass caps so that measurements can be made at the same stations well into the future. We are anxiously awaiting flow conditions that permit re-measurement of the stations so that we can see the effects of last winter's flows.

### **Los Padres National Forest**

Contact: Maeton C. Free  
(916) 573-2600 (R05F19A)

The Los Padres fish crew has been active since mid-April conducting stream surveys of both anadromous and resident streams. Above normal rainfall this year has produced higher flows with longer duration than in recent years, and several streams have shown good re-population by resident species.

The forest is also conducting a special FHR study on the current status and distribution of steelhead within the forest. We are also working cooperatively with California Department of Fish & Game in steelhead studies on the Santa Clara and Santa Ynez river systems and conducting cooperative studies on the Carmel River to assess impacts of a proposed new dam and reservoir. Our steelhead study also involves DNA studies of local steelhead in conjunction with U.C. Berkeley researchers.

### **Lake Tahoe Basin Management Unit**

Contacts: Jeff Reiner/Julie Perrochet/  
Annelise Carleton  
(916) 573-2600 (R05F19A)

An exceptional snowpack and the promise of a rebound from years of drought have the staff at the Lake Tahoe Basin Management Unit (LTBMU) excited about the 1993 field season. The LTBMU continues to coordinate the Inland FHR program among all the inland fisheries biologists. In the months ahead, seven FHR projects will be undertaken on several inland forests.

The unit will be busy on several regional projects. The Inland FHR program will coordinate a

meadow stream Desired Future Conditions (DFC) study with Dave Azuma of PSW-Albany. Field crews from the LTBMU, the Tahoe and Lassen National Forests will gather data on “near-pristine” and managed mountain meadow streams on National Parks and National Forests throughout the Sierran and Southern Cascade regions. The data collected will be compiled and analyzed to create a database of the range of conditions found in meadow streams.

In other cooperative efforts, the data that was collected for the past two years in the Channel Islands National Park has been analyzed, and Jeff Reiner continues to act as advisor to the park staff in the development of monitoring and management plans.

Annelise Carleton has been working on the Regional Fisheries Database to coalesce the stream data collected throughout the region. Thad Edens of PSW -- Albany has been diligently working on getting all of the glitches out of the data. The Database isn't complete yet (pending data from several forests), but already we've fielded a query request from the Portland working group, so keep that data coming in!

Julie Perrochet is working with biologists region-wide to coordinate amphibian survey efforts. The LTBMU is also cooperating with the Regional Office in developing strategies to manage and monitor for riparian TES species.

On the LTBMU, stream assessment work continues with funding from the California Tahoe Conservancy. This year, in addition to two stream assessment crews, the LTBMU will have a two-person monitoring crew responsible for project-specific physical and biological monitoring. This fall the largest restoration project on the LTBMU to date gets underway as the Watershed Staff re-designs a drastically altered stream channel.

In a landmark decision, the forest supervisor on LTBMU signed a decision notice to put the Meiss

Meadows grazing allotment into a period of long-term rest. The meadow contains the headwaters of the Upper Truckee river, and is the site of a Lahontan cutthroat trout restoration project. Stream survey data and input from the Fisheries staff were instrumental in providing the supporting evidence to restrict grazing in the area. Look for resource data to provide an increasingly important role in management and political decisions in the future.

### **Mendocino National Forest**

Contact: Emil Ekman  
(916) 934-3316 (R05F08A)

Covelo Ranger District personnel joined the California Department of Fish & Game in the twenty-fifth year of the annual, week-long summer steelhead snorkeling survey. The district packs food and equipment in to the snorkeling team at the various camping sites along the Middle Fork of the Eel River, and helps in the actual survey.

Summer steelhead are a Sensitive Species in Region 5. There is an ongoing effort to elevate that listing to Threatened under the Endangered Species Act. The summer-run in the Middle Eel has declined in the past several years in spite of restrictive fishing regulations, extra law enforcement efforts, and trail and road closures that limit access by poachers. This year's count of 516 adults was 175 less than the previous year.

The summer steelhead smolts, as well as all other salmonid downstream migrants in the Eel River system, must now run the gauntlet of a burgeoning squawfish population. Findings by Dr. Larry Brown of the University of California, Davis, and others, indicate that the squawfish are increasing in numbers and distribution in the Eel



River each year. The Mendocino National Forest is working with the CDF&G in evaluating different means of reducing or eliminating squawfish in certain key salmonid habitats in the Eel River system. Current methods of control have so far included the use of explosives in areas of squawfish concentrations, and the maintenance of natural barriers to their upstream movement. If squawfish move into the upper reaches of the Middle Eel, it is likely that they will eliminate summer steelhead.

The Mendocino National Forest is also working to improve the habitat for juvenile salmonids in areas free of squawfish. Those are sanctuary areas where the steelhead may remain and grow larger before making their way downstream. The larger they are, the better their chances of not being eaten.

### **Modoc National Forest**

Contact: Marty Yamagiwa  
(916) 233-5811 (R05F09A)

The Modoc National Forest will be focusing this summer on obtaining the necessary data to complete biological assessments for the 18 allotments that have Threatened and Endangered fish (Lost River sucker, shortnose sucker and Modoc sucker). The forest is also involved with the Goose Lake Fishes Working Group developing a conservation strategy for the recovery of the species of the Goose Lake Basin.

The forest recently completed a biological assessment for a land exchange along Ash Creek. Ash Creek is one of only a handful of streams that still contain the native fishes of the Sacramento River drainage in an intact assemblage with a high level of integrity. By acquiring this land, the forest may not only be able to prevent further degradation, but may also perform habitat

restoration. We are currently working on completing the Allotment Management Plan in this area.

Due to the recent drought conditions, most of the reservoirs on the forest were dry by late summer last year. In an effort to re-establish the popular reservoir fisheries of the Modoc, the forest wrote a comprehensive plan that addressed the biological potential and corresponding recreational opportunities that existed on the forest. This plan, developed in conjunction with the California Department of Fish & Game, focused on both warmwater and coldwater fisheries.

The forest prioritized 26 reservoirs and worked closely with the Modoc Bass Anglers, Modoc Chapter of Trout Unlimited, and The Modoc County Fish, Game, and Recreation Committee. Strategies to reach the desired future condition of the reservoirs were developed, and areas were prioritized utilizing public input and historic use patterns. This effort has strengthened our partnerships with the public and has demonstrated our commitment to recreational fishing.

Representatives from the various groups are now working with the forest on cooperative habitat improvement projects. The Modoc County Fish, Game, and Recreation Committee has taken the lead in working with the Forest Service and other user groups in developing a fishing brochure highlighting selected reservoirs on the forest and have committed to helping us market the "Rise To The Future" program. Having three endangered fish on the forest has caused us to carefully plan this reservoir fisheries program. Working closely with the various user groups has helped us emphasize the value of TES species and has been an effective way for us to stress the importance of not illegally moving fish, a locally historic problem.



### **Plumas National Forest**

Contact: Leslie Mink  
(916) 283-2050 (R05F11A)

Once again on the Plumas National Forest this year the Coordinated Resource Management Group is spearheading the most exciting projects. We will be working with them to continue the slow restoration process on two eastside streams. Biotechnical willow planting, along with bank sloping with heavy equipment, and improved grazing management should restore these two streams to primarily trout fisheries within five to ten years. We are also working with them to restore two high elevation meadows that contain important spawning habitat. One is a tributary to the wild and scenic Middle Fork Feather River, which is also a state designated Wild Trout Stream. The other is a tributary to popular Bucks Lake. Both of these projects will result in an increase in wild trout populations in popular fisheries.

It is a good thing that we have the Coordinated Resource Management Group to work with, because fisheries suffered in the budget cuts -- as did most other resources. The difference was that we didn't have that much to spare! We lost the assistant forest fish biologist position, and are back to one forest fish biologist. We do have a cooperative education student coming along, though, and that should enable us to accomplish more work. This spring, we were also able to enlist the help of a couple of well-qualified volunteers to assist in a spawning and fish passage barrier survey.

In 1992, we participated with Jerry Barnes of the Six Rivers National Forest in a study of fish populations in Lake Davis. We hope to join the state in a pilot reservoir management program using Lake Davis.

This year, we received an FHR grant to survey the forest for herpetofauna, particularly red-legged frogs and western pond turtles. We will be training a temporary crew to do the surveys, as well as some permanent workforce people.

Interested members of the community and some USFS folks from other disciplines on the Plumas National Forest and from neighboring forests will also attend the training. We are happy to participate in a random sample protocol for a regional database, as well as investigate some historical sightings for monitoring as well as our own management purposes. We will be sharing whatever information we gather with the rest of the region this fall.

### **Sequoia National Forest**

Contact: Matthew Lechner  
(209) 784-1500 (R05F13A)

Things are as busy as usual on the Sequoia. Since last year we have hired a new aquatic resources specialist -- welcome, Holly Eddinger, to the Region 5 fish team! Holly is already busy working on two allotment management plans, coordinating five national fishing week events, training our summer field crews and jumping into our warmwater program. She also serves as computer wizard and manages our forest database in her spare time. Holly's energy has been a boost to the entire program.

We are continuing our Little Kern golden trout recovery project. Teresa Pustejovsky, Tule River district fish biologist, is busy with EA revision, documenting riparian impacts, and preparing a biological assessment for critical habitat. If things go well we hope to begin the process to remove the fish from the threatened species list within the next five years. It would be nice to see a species be de-listed due to recovery.

Genetic analysis and stream treatments are on tap for the summer. As always, interested people should contact Teresa to get some experience with chemical treatments. It is also some of the prettiest country in the Sierras. In addition, Teresa has been busy with preparing a management strategy (heavy on public input) for the Tule River watershed.

Our warmwater fisheries program at Lake Isabella is one of the more fun things we get to do. Tina Tharalson, Cannel Meadow district fish biologist, is busy with creel surveys, fish sampling, and habitat improvements. We got \$40,000 from the state's Adopt-A-Lake program and are implementing some neat things for fish and the people trying to catch them. In addition, the district is holding a "Get Hooked on Fishing -- Not On Drugs" kids fishing tournament for the second year in a row. Last year we had 450 kids and are hoping for a repeat performance. The district is also helping to prepare a management strategy for the Upper Kern River.

We received \$47,700 dollars in matching funds from the National Fish and Wildlife foundation for the restoration of the native fish of the Kern River drainage. We have the matches lined up and are starting to gear up for a busy summer. Projects will include 20 to 30 genetic samples (collected and run), and an interpretive project for the origin of the golden trout complex of fish. The golden trout is the California state fish and is endemic to the Kern River drainage (which we share with the Inyo National Forest, and Sequoia National Park). We also are planning our labor project for the Kern River drainage. This year we hope to accomplish a lot of meadow restoration projects with the help of Trout Unlimited and the local fly-fishing clubs. Last year's project had over two hundred people working on the weekend.

Never a dull moment.

## Shasta-Trinity National Forest

Contact: Melanie Vael Anderson  
(916) 623-2121 (R05F14A)

This past year the fisheries and wildlife departments have begun to implement joint projects to benefit both salmonids and waterfowl. One of these projects, the Sven Olbertson pool-channel, was planned in three phases, the first of which was completed last summer. Now we are planning phase two for implementation this summer. (To clear up the mystery, 'Sven Olbertson' is derived from Stevens, Olson, Roberts and Anderson, the USFS designers.)

The mainstem of the Trinity River just below the Trinity Hatchery (at Lewiston Dam) contains a spawning side-channel which has been in place for over a decade. Overwintering juvenile habitat has been proposed as a factor limiting the survival of steelhead here. A dirt parking lot adjacent to the existing side-channel was partially converted last year to a combination waterfowl pool and connected side-channel for fish rearing (Phase 1). Funds were provided by USFS, California Environmental License Plate fund (CELP), and Ducks Unlimited. United States Bureau of Reclamation (BOR) and United States Fish and Wildlife Service (USFWS) staff scientists assisted us in site design and layout.

Our limiting factor last year was funding, so only a simple side-channel and small pond were created. USFS and CCC crews placed cobble and boulder structures in the side-channel and planted the resultant berms and island with a variety of native riparian trees and groundcover. Submergent and emergent aquatic plants were added around the inner perimeter of the waterfowl pool.

Since we completed Phase 1, this area was included in the California Wildlife Viewing Guide (Clark 1992) as Area 14. Watchable Wildlife signs direct visitors to the site from Lewiston and from



the Trinity Heritage Scenic Byway along Highway 3 north of Weaverville. The anticipated impact of increasing numbers of recreationists has helped shape the future plans for the project.

This spring, personnel from BOR and USFWS approached us with the idea of expanding the project area utilizing Trinity River Basin Restoration Project funds. BOR and USFWS scientists have again assisted us with site planning, which will result in replacing the remaining parking area with an expanded pool of varying depths. Another side-channel, much longer than the first, is planned for the opposite side of the pool, designed to permit continuous through-flow and prevent stranding of fish. The second side-channel will meet the first down stream from the pool, and the outflow reach will be designed as a spawning riffle. Both side-channels will be overexcavated and lined with cobble, and the berms backsloped to maximize usable habitat. Vegetation will screen the site from visitors, and access trails will be added for anglers at this flyfishing-only portion of the Trinity River.

Next year, we hope to develop the recreational and educational portions of the project, with a trail from here to the hatchery and informational signing along the trail. It is an exciting project to see develop, so stop by and enjoy the Watchable Fishlife and Wildlife on your way through Trinity County!

### Sierra National Forest

Contact: Mary Kay Buck  
(209) 487-5250 (R05F15A)

For the second year, the Sierra and Sequoia National Forests will be cooperating with Dave Martin, Canorus Limited, to conduct distribution surveys for anurans on the two forests. Last year, Dave and his crews surveyed areas in the El Dorado, Stanislaus, Sequoia and Sierra national

forests. The most frequently sighted frog species was the Pacific tree frog on all four forests. The mountain yellow-legged frog was seen only on the Sierra and Stanislaus forests. The Yosemite toad was sighted only on the El Dorado and the Sierra forests. The foothill yellow-legged frog was only seen on the El Dorado, and no sightings of the California red-legged frog were made on any of the forests. A second year of survey effort will help to further examine the distribution of declining Sierran Nevadan anuran species mentioned above.

We are expanding our survey efforts to investigate distribution of Western pond turtles on the Sierra National Forest this year. Devin Reese and Dan Holland will provide training for the crews. This survey effort is timely due to the fact that the Western pond turtle may be proposed for listing this year. We will be concentrating our fish habitat survey efforts in the Jose Basin, West Fork Jackass Creek and Dinkey Creek watersheds in conjunction with ecosystem management analysis and allotment rewrites. We will use the same quantitative methods we tried last year (pebble counts, LWD measurement, measuring embeddedness along transect lines) to continue to define our desired future condition criteria. We found these methods more time consuming, but they gave us the precision we needed.

Last year we conducted fish habitat surveys in streams in the wilderness and in Yosemite National Park. We focused on "C" channels to investigate whether there are differences between "C" channels in pristine streams vs. those in streams that are impacted with management activities. We will be comparing such features as habitat types, pebble counts and undercut banks. Analysis of the data will take place this year.

Over the last three years, Marilyn Myers has monitored several reaches in West Fork Jackass Creek, which included invertebrate sampling. West Fork Jackass Creek is in poor condition with considerable amounts of sand and fines impacting instream habitat.



Invertebrate sampling revealed high numbers of stoneflies, mayflies and caddisflies within the sampled areas and no indication of sediment tolerant species dominating. If current aquatic invertebrate indices are used to rate the condition of the stream, they would indicate the stream is in good condition based on aquatic invertebrate diversity and counts found. This study indicates that current aquatic invertebrate indices may not be sensitive enough to make conclusions about the health of a stream.

The Sierra National Forest fisheries staff has undergone some major changes. Both Marilyn Myers and Lucy Wold have left to broaden their horizons. Lucy is now working on the Mt. Hood National Forest and Marilyn Myers is going back to school to get a Ph.D. at U.C. Berkeley. We will be filling these two positions by the end of this fiscal year.

### **Six Rivers National Forest**

#### *Fisheries*

Contacts: Jerry Boberg/Karen Kenfield  
(707) 442-1721 (R05F10A)

As always, things are busy on the Six Rivers. Besides all the work ongoing at the Smith River National Recreation Area (see separate section), the rest of us are continuing to do our best to keep track of all the fishes and other aquatic life in our streams and lakes.

We are continuing with downstream migrant trapping of juvenile salmonids on two ranger districts this year. In addition we are monitoring the population levels of juvenile salmonids in Horse Linto Creek for the fourth consecutive year. We are also surveying additional lakes using the protocol we developed during the 1992 field season (all of the 1992 lake surveys have been

written up if anyone is interested in seeing what we've found).

With the listing of the Western pond turtle on the Regional Forester's Sensitive Species List, our fisheries staff has been educating themselves on turtle biology and have been conducting surveys on several of the forest's lakes and streams. We are also continuing a study of foothill yellow-legged frog breeding habitat that was started in 1992. All of the data for the frog study has been collected and a report is due by the fall.

Despite declining numbers of anadromous salmonids throughout the Pacific Northwest, we were very excited to find out that Horse Linto Creek was the second largest contributor of chinook salmon to the Trinity River Basin last fall based on coded wire tag data compiled by the USFWS. We have been working on fisheries restoration in the Horse Linto basin (both instream and upslope) since 1979 and it is gratifying to see some of our work paying off.

#### *Watershed*

Contact: Mike Furniss  
(707) 441-3551 (R05F10A)

#### *Road stream crossings project*

A cooperative project to study road stream crossings is underway in northern California. The project is a joint research project between the Six Rivers National Forest, the Humboldt State University Institute for River Ecosystems, and the California Department of Forestry and Fire Protection. The project began with funding from the anadromous Fish Habitat Relationships Program, and is currently funded by CDF, the EPA and the Forest Service watershed group. The goal of the project is to produce a coherent, useful manual for the interdisciplinary evaluation and design of road stream crossings.

Bill Trush, River Institute director, and Mike Furniss, Six Rivers NF forest hydrologist, are the principal investigators. George Donohue (watershed), Sam Flanagan (geology) and Wes Smith (geology) are earning master's degrees at Humboldt State as "culvert nerds." Dr. Andre Lehre (Humboldt State University geology department) is providing hydrological forecasting and risk assessment. In addition, the National Council for Air and Stream Improvement is involved through the participation of Dr. George Ice.

Our project timeline is three years. To prepare a practical handbook, several literature reviews and original research objectives are in progress:

- (1) Determining the risks and consequences of stream crossing failure with specific design specifications under different flood recurrences and watershed conditions. A method for assessing cumulative risks of all crossings in a watershed is under development.
- (2) Developing methods to predict the risks of culvert plugging by woody debris. We are developing woody debris budgets for selected crossings and attempting to determine fluvial and stream crossing configuration controls on the formation of plugs at culvert inlets. Preliminary analysis suggests that smaller culverts (particularly less than 36" diameter) might best be sized for woody debris passage rather than discharge capacity.
- (3) Developing specific procedures for sizing to meet environmental goals, especially to minimize clogging and fish migration barrier potential.
- (4) We've noticed that steel culverts observed in northern California (and elsewhere) have a corrosion zone or "rustline" extending partway up both

sides of the barrel. Preliminary monitoring indicates the discharge corresponding to the stage height of this rustline has an exceedance probability of approximately 10 to 15 percent on a daily average flow duration curve. The rustline might be useful as a rapid monitoring tool for assessing installed culverts and for design.

- (5) Providing workshops for landowners and natural resource professionals on environmental design and restoration of stream crossings. Our first presentation was at the Salmonid Restoration Federation Conference in Eureka last March. Others are planned.
- (6) Develop a system for the evaluation of installed stream crossings that will lead to prescriptions for upgrading or "stormproofing", for stream crossing removal, and for remediation of fish migration barriers.

If you have stream crossing data you would consider sharing, particularly any long-term monitoring, or if you want more information on our preliminary results, monitoring procedures, or planned experimental design for the coming winter, please contact Mike at (707) 441-3551 or Bill at (707) 826-3561.

### **Smith River National Recreation Area**

Contact: Mike McCain/Lisa Mizuno  
(707) 457-3131 (R05F10D51)

This year the Smith River crew will be involved in conducting many miles of surveys. Stream surveys will be conducted for large woody debris (LWD) counts and locations. LWD is important in aquatic



habitats for providing complex and critical habitat for both fish and aquatic vertebrates. Also, all instream structures implemented over the years will be located and evaluated as compared to its original intent. In the evaluation process, it will be determined if the structures are still effective, still exist, or require repairs.

### *Biological Monitoring of Juvenile Salmonids*

Annual population censuses of juvenile salmonids are conducted by Six Rivers National Forest as an indicator of the effectiveness of instream structure projects. Census studies using snorkel divers were conducted on six tributaries of the Smith River. Objectives of the study are to correctly identify and count species of salmonids in areas of stream modification as well as "control reaches" where stream modification does not exist. Monitoring of juvenile salmonids will also be conducted on the main branches of the Smith River.

Adult salmonids will also continue to be monitored within the three stems of the Smith River by direct observation. This annual census is conducted to identify and count numbers of fish in selected reaches of the river. Data collected from annual studies allows biologists to observe trends in abundance of spring chinook, coastal cutthroat trout, and summer steelhead.

### *Research...*

#### *Little Jones Creek*

The long-term monitoring of Little Jones Creek coastal cutthroat trout (*Oncorhynchus clarki clarki*) will continue in FY93 with a population study using methodology described by Hankin and Reeves (1988). This will be the third consecutive year a population estimate has been undertaken. An otolith study of cutthroat trout will be conducted, providing valuable age-growth information. In addition to the demographic study, the Pacific Southwest Research Station,

Arcata, will begin a small scale cover manipulation study to determine the effects on colonization.

### *Mainstem Research*

In coordination with the Humboldt State University Institute for River Ecosystems, the Smith River National Recreation Area is conducting several research projects on the large branches and mainstem of the Smith River. Mainstem spawning surveys in 1992 identified twelve chinook spawning sites and tested a variety of survey techniques. More comprehensive surveys and characterization of mainstem spawning sites are planned for 1993. Mainstem rearing is being studied this year through outmigrant trapping and direct observation. Fyke net and pipe traps are being implemented on selected tributaries, the middle fork and the lower mainstem, to monitor the flux and composition of outmigration. The middle fork will serve as a study segment for the development of a method of estimating abundance of observable juvenile salmonids. To manage the problems of large river sampling, the segment will be stratified by habitat subunit types.

### *Smith River Estuary: Graduate Co-Op Research*

As part of a basin-wide survey, a graduate project has begun on the Smith River Estuary. The study entails conducting an inventory and classification of habitat types based on the USFWS classification scheme. Global Positioning System will be used to delineate habitat types and vegetation plots as well as marking downed woody debris and other distinct features. As part of the classification scheme, benthic invertebrate samples will be taken to determine dominant species and provide a list of potential food sources for fish and invertebrates. Seining will be conducted twice a month to examine timing and locality of fish utilization and to provide a list of species which utilize the estuary.



### *Inter-Agency Committee*

The Smith River National Recreation Area Fisheries Unit has spearheaded a new committee called the Smith River Advisory Committee. The committee, formed in July 1992, is a conglomerate of local concerned citizens, environmental groups, user groups, Humboldt State University staff and students, and state and federal agencies. The role of the council is to coordinate the research efforts and projects of the members and serve as a means for the members to share information with one another.

Some of the short term goals of the committee are: to work on collecting historical data of the Smith River fisheries; to develop economic data on the relationships of the local economy to fisheries, as well as other interests, and uses of the river; and to develop projects and activities in coordination with local non-profit community-based organizations. A challenge-cost share agreement has been implemented beginning in FY93 between USFS and Rural Human Service, Inc.

Some of the long term goals of the committee are: to work at restoring and preventing further decline in health and abundance of aquatic species; to repair and prevent further damage to the watershed; and to foster community involvement and start education programs through outdoor classes and integration into school curriculums.

Participants: California Conservation Corps, California Department of Fish & Game, California Parks and Recreation, California Trout, Humboldt State University, Redwood National Park, Reservation Ranch, Rivers Institute, Rowdy Creek Hatchery, Rural Human Services, Smith River Alliance, U.C. Sea Grant, USDA Forest Service, Various members of the community and user groups.

### **Tahoe National Forest**

Contact: Ann Carlson  
(916) 265-4531 (R05F17A)

The streams and rivers are flowing at bankfull, and life is great if you are a fish.

In FY 1993, the Tahoe Fish Program has objectives in several diverse emphasis areas: aquatic education, increased partnerships, increased communication with California Department of Fish & Game (CDF&G), surveying for potential reintroduction sites for Lahontan cutthroat trout, improving fish and riparian habitats, and protection of existing habitats.

The aquatic education program has really blossomed. We now have three adopt-a-stream programs through local schools and seven other schools interested in possibly starting up their own program. The adopt-a-stream program at Nevada Union High School is in its fourth year and has taught over 1,000 students about streams and aquatic ecology. Camptonville School adopt-a-stream program is designed for kindergarten through eighth grades, and Foresthill School targets sixth, seventh and eighth grades. Each program is unique and receives much support in the community.

On June 12, the Tahoe National Forest, in cooperation with CDF&G and Gold Country Fly Fishers, hosted the second annual Fisheries Awareness Day. We got such a favorable response to last year's event that this year we expanded it by including several more educational stations and targeting approximately 150 kids.

We have also increased our internal education by creating a mobile exhibit on "Amphibians of the Forest" to be posted at the ranger districts. I have been very fortunate to have an assistant, Monica Banholzer, who has very strong skills in education and graphics.

The Tahoe has five cooperative stream habitat improvement projects in the works for 1993. Our partners are CDF&G, Wildlife Conservation Board, PG&E, Career Shadow, Placer County Water Agency, and public interest groups. One of the projects is to deepen Milton Reservoir to create better trophy trout habitat. The other four projects are located on streams. We have made a concerted effort to integrate these projects as much as possible with hydrology, soils, range, botany, and wildlife.

The Milton Reservoir project is a good example of a joint effort and good communication between the Forest Service and CDF&G. The need for deepening the reservoir was originally identified by CDF&G; the Forest Service then wrote the proposal seeking funding, and the this summer's implementation phase will be a joint effort.

The Tahoe and CDF&G are presently working together on Lahontan cutthroat trout surveys, several electroshocking surveys, wilderness lake fish surveys, review of Haypress hydroelectric project, and monitoring of the Sierraville water diversion. The fish expertise provided by CDF&G biologists complements the stream and riparian habitat expertise provided by the forest biologist.

Another exciting project for the Tahoe is the study of the role of small wood debris in several streams on the forest. Stream surveys over the past years have indicated that accumulations of small wood in streams, particularly small streams like we have in the Sierra, may provide good habitat for fish. This summer we will be measuring and mapping small wood and fish use of the wood-created habitat. This project is funded by the Region 5 FHR program, and is a cooperative project with Neil Berg and Dave Azuma at PSW, Albany.

We will be conducting our usual stream surveys in summer 1993. A new twist this year is that we will be adding monitoring of stream

reaches following the new regional guidelines for stream monitoring. Also, Tahoe crews will be surveying several streams for potential sites for reintroduction of Lahontan cutthroat trout. All in all, this is a productive and busy year for the Tahoe fish program.

### **Pacific Southwest Research Station Redwood Sciences Laboratory Herpetofaunal Research**

Contacts: Hart Welsh and Amy Lind  
(707)-822-3691 (S27LOIA)

### *Riparian Amphibians and Reptiles*

A recent and soon to be published report by M. Jennings and M. Hayes (commissioned by the California Department of Fish and Game) indicates that 45 percent of California's herpetofauna are listed (state or federal) species of special concern, or deserving of such status. Declines of some species have been so severe that they are completely absent from large portions of their historical ranges (e.g. mountain and foothill yellow-legged frogs, Yosemite toad, western pond turtle). Many of these species inhabit, and now depend on, healthy aquatic and riparian habitats in national forests and national parks.

We see the Riparian Initiative, issued recently by the Regional Forester, as a step in the right direction toward assessing the health of aquatic and riparian ecosystems on California's National Forests. Ecosystem Management may also provide both the incentive and the funding to examine the effects of management activities on all species that inhabit riparian areas. We realize that with this new interest in amphibians and reptiles comes the need for specific management recommendations.



Through research we can provide the kind of information needed by district and forest biologists. We plan to continue to offer training and telephone consulting, and to present our results in reports and peer-reviewed journals. We have published several papers on the effects of timber harvesting on amphibians and reptiles. The following reports also are currently available: (1) habitat associations of the Del Norte salamander, southern Olympic salamander, and tailed frog (contact R. Matroni of California Department of Forestry, Sacramento, for copies); (2) distribution and habitat associations of birds, mammals, amphibians, and reptiles and species-specific information on western pond turtles and foothill yellow-legged frogs on the Trinity River (contact R. Roberts of the US Fish and Wildlife Service, Weaverville); and (3) the effects of road sediment input on the aquatic amphibian community at Prairie Creek Redwoods State Park (contact M. Moore, California Department of Transportation, Eureka).

### *Frog Monitoring Update*

In the summer of 1991, we proposed a monitoring protocol for frogs and toads on Region 5 Forests. *FHR Currents* Number 4 (May 1991) describes this protocol, gives background information, has species descriptions and a key, and provides a sample data form. Our intent in putting forth this protocol was to establish baseline information on frog and toad populations in conjunction with a systematic sampling of streams (habitat typing) for fish.

We are currently working with Ken Roby to include frog sightings in the newly established Regional FHR database. We recently sent out a survey to all the forests in the Region, asking for detailed information on formats for data collected on frogs or other

amphibians over the past several years. This survey is an effort to determine how to merge information from different forests for the regional database. We received responses from ten forests. We know there are other forests out there collecting this data -- please take a few minutes to fill out the survey.

### *Current Research*

We are presently conducting research on several species of riparian herpetofauna in Northern California. These are described briefly below. If you want more information, please contact us.

- Demographics, movements, and habitat associations of the western pond turtle (*Clemmys marmorata*). This is a four-year study funded by the Bureau of Reclamation. It compares populations on the mainstem and south forks of the Trinity River in order to evaluate the potential impacts of the Lewiston Dam on pond turtles. This study will also generate information on life history that can be applied towards managing for this species which is currently a candidate for Federal listing. The study makes use of mark-recapture, radiotelemetry, habitat measuring, and visual census techniques. Devin Reese (a Ph.D. student from U.C. Berkeley) is conducting the research. She is currently working on a field sampling protocol for turtles that will appear in a future *FHR Currents*.

- Reproductive biology and habitat associations of the foothill yellow-legged frog (*Rana boylei*). This is the final year of a three-year study, also funded by the Bureau of Reclamation, on the main and south forks of the Trinity River. This study uses visual counts and habitat quantification methods to compare ecological characteristics of this species on the dammed mainstem and undammed south fork. Dave Fuller (Six Rivers National Forest) will also be continuing work on this species on several Six Rivers streams.



- Mesohabitat distribution and microhabitat associations of a stream amphibian community. This study was funded primarily by the Six Rivers National Forest and was conducted by Lisa Ollivier (a master's student at Humboldt State University). The study focused primarily on the tailed frog (*Ascaphus trueii*) and Pacific Giant Salamander (*Dicamptodon tenebrosus*) in ten streams of the Smith River drainage, five of which have experienced streamside harvesting of Port-Orford cedar. Write-up is in progress.

- Demography, habitat use, and food habits of the western aquatic garter snake (*Thamnophis atratus*, formerly *couchii*). We are beginning our eighth field season of this study which uses a mark/recapture method to study population dynamics, prey choice, and movement as well as habitat use of this mid-level aquatic predator at Hurdygurdy Creek (a tributary to the south fork of the Smith River).

### **Pacific Southwest Research Station, Albany Inland Fisheries**

Contact: Kathleen Matthews  
(510) 559-6454

#### *Cool water formation and trout habitat use in a deep pool in the Sierra Nevada, California*

On a relatively pristine section of the North Fork of the American River, we conducted a study to document temperature stratification in a deep bedrock pool, describe the diel movement of trout, and determine whether trout preferentially sought cooler portions of the pool.

From July 30 to October 10, 1992, the main study pool and an adjacent pool stratified (temperature difference between surface and bottom up to 4.5 degrees Celsius) on all but two days. Six rainbow and brown trout equipped with temperature-sensitive radio transmitters used water temperatures ranging from 12-19.3 degrees Celsius throughout the diel period. During the late afternoon, when the widest range of water temperature was available, trout were found in temperatures up to 19.3 degrees Celsius even though cooler (14.5 degrees Celsius) water was available. Trout were not, however, found in the warmest, shallowest portion of the pool during the day when water temperature peaked. Radio-tracking indicated that fish were most active and had largest home ranges at dusk and night; fish were least active during the day.

Because we found no evidence of subsurface seepage into the pool and the incoming water into the pool was warmer than the pool's maximum temperature, we speculate that the pool geometry and depth of deep pools may serve to moderate elevated summer water temperatures which can stress trout populations. Future work will determine how widespread these thermally stratified pools are in the Sierra Nevada and whether similar pools exist in more impacted (e.g. logged, grazed) areas. (Matthews, Berg, Azuma, Lambert-PG&E).

#### *Year-to-Year Variability in Trout Populations in a Pristine Headwater of the North Fork of the American River and Inter-Pool Movement of Trout*

Before researchers can assess impacts (single or cumulative) of management activities, research must be conducted in areas relatively disturbance-free. While "pristine" stream systems are rare or nonexistent in California, privately owned land on the North Fork of the American River (NFAR)

does provide a mechanism for researchers to collect basic fish ecology information in a stream relatively free of anthropogenic impacts (logging, grazing, etc.). One project is designed to collect basic trout population dynamics data enumerating the year-to-year difference in abundance and basic movement patterns. This information can then be used to provide a background to compare data from “managed” areas subjected to the impacts researchers are attempting to assess. (Matthews, Ballard, Broughton, Azuma).

### *Aquatic Diversity Management Areas*

The concept of Aquatic Diversity Management Areas (ADMAs) has been proposed by Professor Peter Moyle of U.C. Davis to identify the best examples of California’s diverse aquatic ecosystems before they are stressed to the point of collapse. The major assumption behind ADMAs is that the best way to avoid extinction or endangerment of species is to protect their habitats before they deteriorate to the point where emergency action is necessary. We have initiated a cooperative agreement with Professor Moyle to identify and designate specific aquatic diversity management areas for native fishes on Forest Service Lands in the Sierra Nevada.

### *Golden Trout Population Ecology in Grazed and Recovering Meadow Streams on the Inyo National Forest*

We have initiated a high mountain ecosystem research project along with several other people: RWU scientist Dr. Ann Dennis (botanist), NFS-PSW liaison Ken Roby, academic scientists Drs.

Roland Knapp, Tom Dudley and Dennis Odion, and Inyo National Forest specialists Sara Chubb (fish biologist), Del Hubbs (range conservationist), and Terry Hicks (ecologist). Starting in the summer of 1993, we will compare physical and biological factors inside and outside of cattle exclosures in the Golden Trout Wilderness. We will use radiotransmitters to compare the diel habitat use and movement behavior of the golden trout inside and outside of the exclosures.

Despite the ecological and recreational importance of the golden trout, little is known about its behavior, life history, or population dynamics. Because baseline data were collected before the installation of cattle exclosures, we will also be able to assess the recovery of the meadow streams for up to 10 years after halting grazing (Matthews, Ballard, Broughton, Azuma, Osterhuber).

### *The Effect of Gold Dredging on Trout Populations*

Suction gold dredging is a common activity on several California forests. On some streams, such as Nelson Creek on the Plumas National Forest, dredging claims operate in most pools along the creek and may occur over the entire summer. Little is known, however, about the effects of dredging activities (increased turbidity and disturbance of substrate) on the habitat or aquatic organisms. In collaboration with Fish Biologist Leslie Mink (Plumas National Forest), we are conducting a survey of dredged and undredged (control) portions of Nelson Creek to determine if there are differences between trout population structure, turbidity, sedimentation, and pool attributes (Ballard, Matthews, Broughton, Azuma).







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